UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,840	12/03/2003	Seiji Inaoka	10030737-1	7415

22878 7590 10/31/2007

AGILENT TECHNOLOGIES INC.
INTELLECTUAL PROPERTY ADMINISTRATION,LEGAL DEPT.
MS BLDG. E P.O. BOX 7599
LOVELAND, CO 80537

EXAMINER
NOGUEROLA, ALEXANDER STEPHAN

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
10/31/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPOPS.LEGAL@agilent.com

	Application No.	Applicant(s)	
Office Action Summary	10/727,840	INAOKA, SEIJI	
	Examiner	**Art Unit**	
	ALEX NOGUEROLA	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-27* is/are allowed.

6)☒ Claim(s) *28-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Cai et al. Electrochemical detection of DNA hybridization based on silver-enhanced gold nanoparticle label, Analytica Acta 469 (2002) 165-172 ("Cai").

Addressing claim 28, Cai discloses an electrochemical imaging system comprising

a conductive surface (bare glass-carbon electrode – Figure 1) configured for the formation of at least one image complex thereon (note, e.g., steps of chitosan modification, "X1" attachment, and hybridization in Figure 1) ; and

a voltage supply having electrodes for electrical connection to said conductive substrate (CHI 660 electrochemical analyzer – *2.1 Apparatus* in Cai. Also see article entitled Model 600C series Electrochemical Analyzer/ Workstation article), wherein said voltage supply is configured to apply a voltage to said conductive substrate repeatedly between a relatively low voltage and a relatively high voltage (see in Cai *2.3.5*

Electrochemical detection, which discloses a "positive scan from +0.10 to +0.80 V (versus SCE)." Also see the Model 600C Series, which discloses that the CHI 660 electrochemical analyzer has a potential control range of ±10 V).

Cai does not mention whether applying the repeated voltage may cause the image complex to form when image nanopartlcles are exposed to at least one target complex deposited on said conductive substrate. However, the voltage supply used by Cai could cause the image complex to form as described because Cai discloses a "positive scan from +0.10 to +0.80 V (versus SCE);" the CHI 660 electrochemical analyzer, which is used by Cai has a potential control range of ±10 V, the image nanoparticles used by Cai are silver nanoparticles, and as disclosed in paragraph [0052] of Applicant's specification, which is only cited to show a property of silver ions, "...when a silver ion is used as a precursor for the image nanoparticle, the electrochemical reaction [to form the image complex] will typically take place at a potential between about –300mV and about 300 mV."

Addressing claim 29, Cai discloses at least electronic measurement equipment. See *2.3.5 Electrochemical detection*.

Addressing claim 30, for the additional limitations of this claim see in Cai Figure 1 and *2.3.4 Silver enhancement of gold nanoparticles*.

Allowable Subject Matter

3. Claims 1-27 are allowed.

4. The following is a statement of reasons for the indication of allowable subject matter:

a) Claims 1, 13, and 24:

the combination of limitations in claim 1 requires the steps of "applying a voltage to said conductive support wherein said image nanoparticles are caused to deposit on said at least one target complex to form at least one image complex; and repeating said application of voltage";

the combination of limitations in claim 13 requires the steps of "applying a voltage to said conductive support wherein said image nanoparticles are caused to deposit on said plurality of target complexes to form a plurality of target complexes; and repeating said application of voltage at least once"; and

the combination of limitations in claim 24 requires the steps of

"(c) applying a relatively low voltage to said conductive support wherein said image nanoparticles are caused to deposit on at least one of said plurality of target complexes to form at least a first nucleation point;

(d) applying a relatively high voltage to said conductive support wherein said image nanoparticles are removed from said at least first nucleation point; and

(e) repeating (c) and (d) as desired to cause the depositing of said image nanoparticles on said first nucleation point and on additional target complexes to cumulatively form additional nucleation points."

As disclosed in Applicant's specification

[0046]
An electric potential, which may be generated by a potentiostat, for example, is then applied to the conductive substrate. The voltage applied to the conductive substrate initiates the deposition of the image nanoparticles on the target complexes, forming image complexes on the conductive substrate. Thus, by electrochemical reduction, the target nanoparticles act as nucleation points for the formation of image nanoparticles on the conductive substrate. In other words, the image nanoparticles selectively deposit where the target nanoparticles are disposed on the conductive substrate. As such, the deposition of the image nanoparticles on the target complex is catalyzed by the target nanoparticles. Thereafter, the image nanoparticles deposited on the target complex can be detected using imaging techniques, electronic measurement techniques, and/or mass measurement techniques.

[0057]
As is schematically illustrated in Figs. 2E and 2F, repeated application of voltage, e.g., by use of potentiostat 140, progressively increases the number of target nanoparticles 125 that are activated as nucleation sites and increases the density of image nanoparticles 135 which are deposited on those nucleation sites. After each voltammetric cycle or after two or more voltammetric cycles, the deposited image nanoparticles 135 may be detected in the manner discussed above. Any suitable number of voltammetric cycles may be applied to biosensor system 100 or as is necessary to activate a sufficient number of nucleation sites in order to provide a density of image nanoparticles 135 to provide an image that is sufficiently enhanced, i.e., has sufficient darkness or contrast, for the intended purpose. Typically, about 5 to about 50 voltammetric cycles are applied but more or few cycles may be applied as needed.

In contrast, in the prior art the image nanoparticles are caused to deposit on at least one target complex to form at least one image complex without applying a voltage. Instead, the target complex is exposed to a solution containing the image nanoparticles, such as a silver developing solution, and the image nanoparticle solution is allowed to chemically react with the target complex. A voltage, if used at all, is only used after the image complex has been formed. See the following articles and patents as examples

Su et al. Microcantilever resonance-based DNA detection with nanoparticle probes, Applied Physics Letters, volume 82, number 20, 19 May 2003, pp. 3562-3564, especially the abstract, the third and fourth full paragraph on page 3562 (after the abstract) and the second full paragraph on page 3563;

Su et al. Au nanoparticle- and silver-enhancement reaction-amplified mcrogravimetric biosensor, Chem. Commun., 2001, 775-756, especially the abstract, the second full paragraph on page 755 (after the abstract), and the third full paragraph on page 755 (after the abstract), bridging to page 756;

Park et al. Array-Based Electrical Detection of DNA with Nanoparticle Probes, Science vol. 295, 22 February 200, pp. 1503-1506, especially the abstract and third full paragraph on page 1504;

Cai et al. Electrochemical detection of DNA hybridization based on silver-enhanced gold nanoparticle label, Analytica Acta 469 (2002) 165-172, especially the abstract, *2.3.4 Silver enhancement of gold nanoparticles, 3.2 Silver-enhanced gold nanoparticle* DNA probes for sequence-specific DNA detection;

Kaler et al. US 6,333,200 B1, especially the abstract, Figure 1, col. 03:10-33, col. 03:53 – col. 04:04, and col. 04:58-60; and

Niemeyer et al. DE 10128093 A1, the abstract and the first full paragraph on page 7 (of 7), item 9, of the EPO English language translation of the Description section of DE 10128093 A1.

b) Claims 2-12 depend directly or indirectly from allowable claim 1.

c) Claims 14-23 depend directly or indirectly from allowable claim 13.

d) Claims 25-27 depend directly from allowable claim 24.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alex Noguerola
Primary Examiner
AU 1795
October 25, 2007